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MEMORANDUM

TO: Bill Baker
Bill Billick September 17, 1996

FROM: Dan Robbins cc: Paul Egge
SUBJECT: DVD Axel aus der Muhlen
- Copy Protection Lisa Paul
- Technical Working Group Meeting Fritz Attaway

I. Summary

On September 4-5, 1996, I attended a meeting of the Copy Protection Technical Working Group of the DVD Consortium in San Jose. The purpose of this group is to evaluate the potential technical approaches to providing copy protection and rights management capabilities in the digital environment for various forms of copyrighted content including linear motion pictures. Accordingly, the vast majority of the meeting was devoted to presentations of competing copy protection technologies. Most of these technologies are only intended to protect against dishonest consumers. Therefore, it is generally recognized that sophisticated pirates will be able to "break" the protection systems within 4-6 weeks of their introduction. As with the current scheme of analog copy protection, it is recognized that legal solutions, not technical solutions, must be sought to solve professional piracy problems.

The system that is closest to implementation is one created by Matsushita, a company that plans to release DVD product in Japan on November 1, 1996. Matsushita representatives informed the group that they provided the Member

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Companies with their proposal in late August and currently desire comments as soon as possible. In that regard, the next meeting is set for September 19-20 in Burbank.

II. The Copy Protection Technical Working Group

The group was comprised of both policy and technical representatives of the member companies of various industries including the motion picture, consumer electronics, computer and recording industries. The most highly represented group was the Consumer Electronics Manufacturers Association ("CEMA"), which comprised over 50% of the participants. Representative companies included Toshiba, Matsushita, NEC, Sony, Samsung, Mitsubishi, Hitachi, IBM and Texas Instruments. The motion picture industry was represented primarily by Warner Bros., which had four representatives at the meeting:

- Marsha King, Senior Vice President of Business Affairs and General Counsel;
- Chris Cookson, Senior Vice President of Technical Operations;
- Louis Ostrover, Vice President of New Media Applications and Operations; and
- Greg Thagard, Director of Advanced Technology and Technical Operations.

Also present from the motion picture industry were Mike Fitzgerald of MCA and Katie Poole of Disney.

Chris Cookson, one of the group's co-chairmen, was generally viewed as the motion picture industry's spokesperson. Throughout the entire two days, Chris was a constant foci of almost every conversation and appeared to be extremely knowledgeable regarding all of the issues and technologies discussed over the course of the meetings. Although not present at these meetings, Bob Lambert of Disney is also listed as a co-chair of this group.

III. Working Group Activities/Discussions

With the introduction of consumer digital devices capable of playing, transmitting and recording digital linear motion pictures, the capability for making and distributing high quality copies or retransmissions of the original copyrighted material has dramatically increased. The overall objective of the technical working group is to identify and evaluate technical approaches which could be potentially used to protect content delivered by direct electronic transmission or prerecorded

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media, against copying in analog or digital recorders or against retransmissions in a form contrary to (1) the usage conditions intended by the owner of the copyright or (2) legitimate and reasonable consumer usage. Accordingly, the vast majority of the meeting was devoted to presentations of competing copy protection technologies.

Although there appears to be some disagreement with respect to what each proposed technology would accomplish, it appeared to be generally agreed that the desirable attributes of any copy protection scheme for linear motion picture and sound content include:

1. Protection for digital motion pictures, including segments as small as single frames, and sound recordings, including samples.
2. A level of protection that will prevent the average consumer from unlawfully making and/or distributing copies or retransmissions.
3. Capability to deal with the three primary options for usage conditions, as well as a method for associating those options with the content in a consistent manner. These conditions are (a) where copying is permitted, (b) where copying is not permitted and (c) where one generation only of copying is permitted.
4. Capability to address current and future classes of content sources and destinations, including (a) digital to digital. (b) digital to analog and (c) analog to digital. where the digital devices include dedicated, stand-alone consumer video recording and playback products, in addition to general purpose digital recording and playback devices associated with computing systems. The analog devices include existing VHF, 8 millimeter and other formats of consumer analog video recorders, as well as the analog interfaces to consumer digital video recorders. The digital and analog interfaces to computers are also included.
5. Capability for application on an international basis.
6. Capability to limit the potential exposure resulting from a breach of the system.

Other important topics included:

1. The level of copy protection efficacy for all copyrighted content.
2. Whether the technology is "fail-safe."
3. The impact on the intended usage of the content (i.e., level of noticeable degradation).
4. Cost.
5. Impact on product schedules.
6. The ability of the approach to accommodate potential future upgrades and .
7. The applicability to existing devices.

From the viewpoint of the consumer electronics and computer systems industries, copy protection should have the following attributes:

1. Acceptably low impact on the cost, performance, manufacturability and availability of devices.
2. Compatibility with accepted standards and existing devices.
3. Compatibility with existing processes and architectures.
4. Upgrade capability and backward compatibility.
5. Broad applicability to all forms of content or software in the computer environment.
6. Applicability to prerecorded disk media of both the stamped and directly written kind.

7. Capability to provide copy management of copyrighted material in both consumer electronic and computer environments.

It is important to note that a general consensus exists that the purpose of the technical group consists of providing technology only sophisticated enough to prohibit the average consumer from unauthorized copying. As this technology will be "breakable" by a skilled computer scientist within a several-week time frame, it is understood that pirates will be able to engage in unlawful copying, a scenario that must be addressed by legal solutions.

In discussions with Chris Cookson, he informed me that the industry is generally not concerned with the type of technology used to create protection, but just that protection exists that will prohibit the average consumer from engaging in unlawful copying. He informed me that the current technologies are likely sufficiently sophisticated to achieve this goal. He repeatedly stressed to me that this is a consumer product that does not justify huge expense to make it extremely hard to break. Instead, the industry just wants a hurdle high enough to stop casual copying by consumers.

IV. The Matsushita Proposal

The technological scheme nearest implementation has been introduced by Matsushita. This scheme has two basic approaches: (a) "content scrambled DVD" and (b) "bus authentication and encryption." The two approaches are summarized below and can be used separately or in combination with each other and/or other systems to provide different levels of effectiveness. However, in PC environments, proposal (b) should be used in combination with proposal (a).

A. Content Scrambled DVD

Under this proposal, the DVD content would be scrambled (encrypted) prior to producing a master which is then used to replicate separate disks during the manufacturing process. Data can be scrambled on a sector by sector basis with certain disk navigation information left in the clear for better control during playback. The chosen scrambling method provides protection equally well for all forms of content including movies, audio and other data. For best security and

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speed, descrambling would be done on chip before the audio and visual decoding process. Various key management and associated authentication strategies are possible, resulting in different levels of simplicity, effectiveness and vulnerability. One method used is a "encrypted disk key" stored in the hidden lead in area, as well as separate encrypted keys for each title which are stored in the sector header area. An important feature of this approach is that a stand alone DVD movie player can be designed which uses only descrambling/decryption, and thus easily meets export regulations.

B. Bus Authentication and Encryption

In this proposal, an encryption process would be included in the DVD/rom drive output circuitry connected to the computer bus and complementary encryption would then be performed at the decoder also attached to the bus. Keys would be transmitted in a secure form over the standard bus from the DVD/rom drive to the audio and video decoder as a result of a two stage bidirectional authentication process. Because this approach does not depend on the content of the source being encrypted, when incorporated in the computer bus interface, it can provide security during transmissions within the computer for a wide variety of media.

During the meeting, Matsushita representatives stated that they had provided detailed versions of these proposals to the Motion Picture Association companies and are hoping for a quick response.

V. Policy Update

During the meeting, there was a brief policy update. We were informed that there was a rapid movement toward an overall plan which included legislation making it illegal to deliberately decrypt encrypted material. This legislation will not mandate any particular type of technology or circuitry. That must arise out of voluntary standards. We were informed that the time frame for creating a basic outline of this legislation is for mid-October.

*** TRANSMISSION RECEIPT ***

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